CONCRETE FLOOR FINISHES

This guide specification has been prepared by Dayton Superior Corporation to assist designprofessionals in the preparation of a specification section covering curing, sealing, and hardening ofconcrete floor surfaces, floor toppings, and non-slip aggregates.

This specification may be used as the basis for developing either a project specification or an officemaster specification. Since it has been prepared according to the principles established in the Manual ofPractice published by The Construction Specifications Institute (CSI), it may be used in conjunctionwith most commercially available master specifications systems with minor editing.

The following should be noted in using this guide specification:

Editing notes to assist users are included within bordered boxes. Delete these notes prior to finalprinting.

Optional text requiring a selection by the user is enclosed within brackets, e.g.: Section[01330][_____]."

Items requiring user input are enclosed within brackets, e.g.: Section [_____-_____]."

Optional paragraphs are separated by an OR" statement, e.g.:

**** OR ****

Metric equivalents to inch-pound units follow the inch-pound units and are contained withinparenthesis. Metric measurements are rationalized units based on the SI system of measurement. Deleteeither the inch-pound or metric units of measure depending on project requirements; do not include bothunits in a project specification, as conflicting requirements could result.

This guide specification is available in both hard copy and a variety of electronic formats to suit mostpopular word processing programs and operating platforms. Please contact Dayton SuperiorCorporation at (800) 745-3707 for additional copies or for information on available electronic formats.

1 GENERAL

1.1 SUMMARY

Edit the following to suit project requirements.

A. Section Includes:

1 Liquid membrane-forming curing [and sealing] compounds for concrete surfaces.

2 Cement based [shake-on floor hardeners] [and] [heavy duty toppings].

3 Liquid non-membrane forming sealing [and hardening] compounds for concrete surfaces.

Edit the following paragraphs to suit project requirements; list only those sections specifically applicable

to the work of this section.

B. Related Sections:

1. Section [03300 - Cast-In-Place Concrete] [_____ - _____]: Concrete substrate.

1.2 REFERENCES

A. American Concrete Institute (ACI):

1 302.1 - Guide for Concrete Floor and Slab Construction.

2 305R - Hot Weather Concreting.
3 306R - Cold Weather Concreting.

B. American Society for Testing and Materials (ASTM):
1 C 109 - Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50
mm Cube Specimens).

2 C 140 - Method of Sampling and Testing Concrete Masonry Units.

3 C 156 - Test Method for Water Retention by Concrete Curing Materials.

4 C 191 - Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.

5 C 309 - Specification for Liquid Membrane?Forming Compounds for Curing Concrete.

6 C 348 - Test Method for Flexural Strength of Hydraulic Cement.

7 C 642 - Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete.

8 C 779 - Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.

9 C 881 - Specifications for Epoxy-Resin-Base Bonding Systems for Concrete.

10 C 882 - Test Method for Bond-Strength of Epoxy-Resin Systems Used with Concrete.

11 C 944 - Standard Test Method for Abrasion Resistance of Concrete or Mortar Surfaces by the Rotary-Cutter Method.

12 C 1042 - Test Method for Comparing Concrete on the Basis of Bond Developed with Reinforcing
Steel.

13 C 1059 - Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

14 D 638 - Test Method for Tensile Properties of Plastics.

15 D 695 - Test Method for Compressive Properties of Rigid Plastics.

16 F 150 - Test Method for Electrical Resistance of Conductive Resilient Flooring.

C. American Association of State Highway and Transportation Officials (AASHTO) M-148-82 (R 1986) - Liquid Membrane-Forming Compounds for Curing Concrete.

D. US Army Corps of Engineers (COE) CRD C-52 - Specifications for Abrasion Resistance.

1.3 SUBMITTALS
Edit the following paragraph to indicate the correct Division 1 section.

A. Submit under provisions of Section [01330] [_____]:

1 Product Data: Include manufacturer's specifications, surface preparation and application instructions,
and protection of adjacent surfaces.

2 Test Data: Confirm compliance with specified requirements.

1.4 QUALITY ASSURANCE

A. Mockup:
Include the following paragraph when a mockup for approval of appearance or performance is required. Edit to indicate the correct Division 1 section. Edit remaining paragraphs to suit project requirements.

1 Apply [hardener] [sealer] to actual substrates under provisions of Section [01430] [_____].

2 Size: [100] [___] square feet ([9] [___] sq m).

3 Location: [_____] [Approved by Architect/Engineer].

4 Determine optimum coverage rate for application.

B. Concrete to conform to following standards:

1 ACI 302.1 for measuring, mixing, transporting, and placing concrete.

2 ACI 305 for hot weather concreting.

3 ACI 306 for cold weather concreting.

1.5 DELIVERY, STORAGE AND HANDLING
Edit the following paragraph to indicate the correct Division 1 section.

A. Deliver, store, and handle products under provisions of Section [01600] [_____].

B. Store materials in a dry area at a temperature between 40 and 100 degrees F (4 to 38 degrees C). Provide adequate ventilation and keep away from ignition sources.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:

1 Do not apply [curing] [sealing] [or] [hardening] compounds at temperatures below 40 degrees F (4
degrees C).

2 Do not apply floor toppings at temperatures below 40 degrees F (4 degrees C) or above 90 degrees F
(32 degrees C).

1.7 WARRANTIES
A 10, 20, or 25 year dustproofing warranty is available for Day-Chem Sure Hard (J-17) if applied by an applicator approved by Dayton Superior. A 5 year dustproofing warranty is available for Day-Chem Hardener (J-15).

A. Provide manufacturer's [5] [10] [20] [25] year warranty against failure of sealing and hardening compound to provide dustproofing protection to concrete surfaces.
2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Dayton Superior Corporation, 402 South First Street, Oregon, IL 61061, (800) 745-3707.
Edit the following paragraph to indicate whether substitutions will be permitted; indicate the correct Division 1 section.

B. Substitutions: [Not permitted.] [Under provisions of Section [01630] [_____].]

2.2 MATERIALS - CURING COMPOUNDS
Include the following for a VOC compliant, water based, white pigmented curing compound, typically for highway paving.

A. Curing Compound:

1 Product: Day-Chem White Pigmented Cure-W (J-9A).

2 Description: Water based, ready-to-use, white pigmented curing compound containing white pigments and other solids in suspension.

3 VOC compliant.

4 Tested to ASTM C 309, Type 2, Class A, and AASHTO M-148, Type 2, Class A.
**** OR ****
Include the following for a VOC compliant, water based, white pigmented curing compound containing resins, typically for highway paving.

B. Curing Compound:

1 Product: Day-Chem White Pigmented Cure (J-10-W).

2 Description: Water based, ready-to-use, white pigmented curing compound containing white pigments and resins in suspension.

3 VOC compliant.

4 Tested to ASTM C 309, Type 2, Classes A and B, and AASHTO M-148, Type 2, Classes A and B.
**** OR ****
Include the following for a clear, resin based, curing compound containing aliphatic solvents.

C. Curing Compound:

1 Product: Day-Chem Rez-Cure (J-11-A).

2 Description: Resin based, ready-to-use curing compound in an aliphatic solvent.

3 Tested to ASTM C 309, Type 1 or 1-D (fugitive dye), Class A and B, and AASHTO M-148, Type 1
or 1-D, Class A and B.
**** OR ****
Include the following for a VOC compliant, water based, clear, resin based curing compound.

D. Curing Compound:

1 Product: Day-Chem Rez-Cure (J-11-W).

2 Description: Water based, resin based, ready-to-use curing compound.

3 VOC compliant.

4 Tested to ASTM C 309, Type 1 or 1-D (fugitive dye), Class A and B, and AASHTO M-148, Type 1
or 1-D, Class A and B.
**** OR ****

Include the following for a VOC compliant, water based, non-membrane forming curing compound.This product does not meet ASTM C 309. This product is compatible with J-15 and J-17 hardening andsealing compounds.

E. Curing Compound:

1 Product: Day-Chem Sil-Cure (J-13).

2 VOC compliant.

3 Description: Water based, ready-to-use curing compound of sodium orthosilicate.

2.3 MATERIALS - HARDENING AND SEALING COMPOUNDS
Include the following for a VOC compliant, water based, hardening compound. Cure surfaces with wet burlap or J-13 curing compound.

A. Hardening Compound:

1 Product: Day-Chem Hardener (J-15).

2 Description: Water based, concentrate, hardening compound of fluosilicates.

3 VOC compliant.

4 Approved by US Army Corps of Engineers, US Navy Department, US Postal Service, and Veterans
Administration.
**** OR ****
Include the following for a high performance, VOC compliant, water based, dustproofing, hardening, and sealing compound. See extended warranty statements above. Cure surfaces with wet burlap, J-13 curing compound, or J-17-C hardening and sealing compound

B. Hardening and Sealing Compound:

1 Product: Sure Hard (J-17).

2 Description: Water based, ready to use, reactive chemical based, hardening and sealing compound.

3 VOC compliant.

4 Approved for use in food preparation areas by USDA.

5 Compressive strength of treated concrete: Average of 3910 psi (27 MPa), tested per ASTM C 140.

6 Water absorption of treated concrete: 3.4 percent in 24 hours, tested per ASTM C 642.

7 Abrasion resistance: 26.5 percent increase after 300 cycles on Taber Abrasion Tester Model 5130.

8 Minimum solids content: 25 percent.

9 Water vapor transmission rate of treated concrete: 217 grams/square foot (2335 g/sq m) per 24 hours.

2.4 MATERIALS - CURING AND SEALING COMPOUNDS
Include the following for a VOC compliant, water based, acrylic, 16 percent solids, ready to use, curing and sealing compound.

A. Curing and Sealing Compound:

1 Product: Safe Cure & Seal (J-18).

2 Description: Water based, ready-to-use curing, sealing, and dustproofing compound containing 16
percent acrylic/styrene copolymer by weight.

3 VOC compliant.

4 Tested to ASTM C 309, Type 1, Classes A and B, and AASHTO M-148, Type 1, Classes A and B.
**** OR ****
Include the following for a VOC compliant, water based, acrylic, 30 percent solids, ready to use, curing and sealing compound. Higher solids improve cure performance and provide longer life for the sealer.

B. Curing and Sealing Compound:

1 Product: Safe Cure & Seal:30% (J-19).

2 Description: Water based, ready-to-use curing, sealing, and dustproofing compound containing

30
percent acrylic/styrene copolymer by weight.

3 VOC compliant.

4 Tested to ASTM C 309, Type 1, Classes A and B, and AASHTO M-148, Type 1, Classes A and B.

5 Maximum moisture loss: 0.3 kg/sq m in 72 hours.
**** OR ****

Include the following for a 12 percent solids, ready to use, curing and sealing compound in aromaticsolvent.

C. Curing and Sealing Compound:

1 Product: Day-Chem Cure & Seal (J-20).

2 Description: Ready-to-use curing, sealing, and dustproofing compound containing 12 percent acrylic/styrene copolymer by weight.

3 Tested to ASTM C 309, Type 1, Classes A and B, and AASHTO M-148, Type 1, Classes A and B.
**** OR ****
Include the following for a 19 percent solids, ready to use, curing and sealing compound in aromatic solvent.

D. Curing and Sealing Compound:

1 Product: Day-Chem Cure & Seal: 19% (J-21).

2 Description: Ready-to-use curing, sealing, and dustproofing compound containing 19 percent acrylic/styrene copolymer by weight.

3 Tested to ASTM C 309, Type 1, Classes A and B, and AASHTO M-148, Type 1, Classes A and B.
**** OR ****
Include the following for a 26 percent solids, ready to use, curing and sealing compound in aromatic solvent.

E. Curing and Sealing Compound:

1 Product: Day-Chem Cure & Seal: 26% (J-22).

2 Description: Ready-to-use curing, sealing, and dustproofing compound containing 26 percent

acrylic/styrene copolymer by weight.

3 Tested to ASTM C 309, Type 1, Classes A and B, and AASHTO M-148, Type 1, Classes A and B.

**** OR ****

Include the following for a 30 percent solids, ready to use, curing and sealing compound in aromatic solvent. Higher solids improve cure performance and provide longer life for the sealer.

F. Curing and Sealing Compound:

1 Product: Day-Chem Cure & Seal: 30% (J-23).

2 Description: Ready-to-use curing, sealing, and dustproofing compound containing 30 percent acrylic/styrene copolymer by weight.

3 Tested to ASTM C 309, Type 1, Classes A and B, and AASHTO M-148, Type 1, Classes A and B.

4 Maximum moisture loss: 0.31 kg/sq m in 72 hours.

2.5 MATERIALS - DRY-SHAKE HARDENING COMPOUNDS

Include the following for a premium quality, non-rusting, shake-on, emery hardening compound, available in colors.

A. Dry-Shake Hardening Compound:

1 Product: Emery Tuff.

2 Description: Ready to use, dry-shake hardening compound containing pure emery, special additives,
and portland cement.

3 Moh hardness of treated concrete: 8 to 9.

4 Compressive strength of treated concrete: 12,000 psi (82.7 MPa) in 28 days, tested per ASTM C

109.

1 Emery/corundum: Contain minimum 50 percent aluminum oxide.

2 Abrasion resistance of treated concrete: 0.4 grams average weight loss, tested per ASTM C 944 with
applied load and time of abrasion doubled.

3 Approved for use by on Class 5 and 6 industrial floors per ACI 302.1.

4 Color: [Natural concrete] [Battleship Grey] [French Grey] [Tan] [Terra Cotta] [Tile Red] [Black]
[Brown] [Green] [Light Reflective].
**** OR ****
Include the following for a premium quality, metallic, shake-on hardening compound, available in

colors.

B. Dry-Shake Hardening Compound:
1 Product: Ferro Tuff SF.
2 Description: Ready to use, dry-shake hardening compound containing well-graded iron aggregates,
special additives, and portland cement.

3 Designed for use on super flat floors.

4 Compressive strength of treated concrete: 10,000 psi (68.9 MPa) at 7 days and 12,000 psi (82.7 MPa) in 28 days, tested per ASTM C 109.

5 Abrasion resistance of treated concrete: Average depth of wear, tested per ASTM C 779:

a. 1/2 hour: 0.003 inch (0.7 mm).

b. 1 hour: 0.009 inch (0.23 mm).

1 Approved for use by on Class 5 and 6 industrial floors per ACI 302.1.
Include the following for a static disseminating compound.

2 Spark resistance:

a. Approved by US Navy Department, NAVFAC TS-09770.

b. Tested per ASTM F 150.

c. Approved by National Board of Fire Underwriters.

d. Electrical conductance range: 25,000 - 250,000 ohms resistance.

8. Color: [Natural concrete] [Battleship Grey] [French Grey] [Tan] [Terra Cotta] [Tile Red] [Black]
[Brown] [Green] [Light Reflective].
**** OR ****

Include the following for a light reflective, metallic, shake-on hardening compound.

C. Dry-Shake Hardening Compound:

1 Product: Ferro Tuff Light Reflective.

2 Description: Ready to use, dry-shake hardening compound containing well-graded iron aggregates,
special additives, white pigments, and portland cement.

3 Compressive strength of treated concrete: 10,000 psi (68.9 MPa) at 7 days and 12,000 psi (82.7 MPa) in 28 days, tested per ASTM C 109.

4 Abrasion resistance of treated concrete: Average depth of wear, tested per COE CRD-C 52/ASTM C

944:

a. 1/2 hour: 0.0054 inch (0.137 mm).

b. 1 hour: 0.006 inch (0.152 mm).

c. 2 hours: 0.0096 inch (0.244 m).

**** OR ****

Include the following for a non-metallic, shake-on hardening compound, available in colors.

D. Dry-Shake Hardening Compound:

1 Product: Quartz Tuff.

2 Description: Ready to use, dry-shake hardening compound containing finely-graded quartz aggregates, special additives, and portland cement.

3 Abrasion resistance of treated concrete; average depth of wear, tested per ASTM C 779:

a. 1/2 hour: 0.017 inch (0.432 mm).

b. 1 hour: 0.032 inch (0.812 mm).

4. Color: [Natural concrete] [Battleship Grey] [French Grey] [Tan] [Terra Cotta] [Tile Red] [Black] [Brown] [Green] [Light Reflective] [White].

2.6 MATERIALS - FLOOR TOPPINGS

Include the following for a non-rusting heavy duty or industrial floor topping.

A. Floor Toppings:

1 Product: Emery Tuff Top.

2 Description: Ready to use, floor topping containing pure emery, special additives, and portland cement.

3 Moh hardness of treated concrete: 8 to 9.
4 Compressive strength of treated concrete: 14,000 psi (96.5 MPa) in 28 days, tested per ASTM C

109.
1 Emery/corundum: Contain minimum 50 percent aluminum oxide.
2 Abrasion resistance of treated concrete: 0.4 grams average weight loss, tested per ASTM C 944 with
applied load and time of abrasion doubled.

3 Approved for use on Class 5 through 8 industrial floors per ACI 302.1.
Edit the following to suit project requirements.

4 Color: [Battleship Grey] [French Grey] [Tan] [Terra Cotta] [Tile Red] [Black] [Brown] [Green] [Light Reflective].
**** OR ****
Include the following for a standard, self-leveling floor topping for use over new or existing concrete designed to take direct traffic.

B. Floor Topping:

1 Product: LeveLayer III.

2 Description: Cement based, non-shrinking, self-leveling floor topping designed to accept traffic.

3 Compressive strength: Tested per ASTM C 109 with following results: Days Compressive Strength
psi (MPa)
1 2700 (18.6)
3 3400 (23.4)
7 4200 (28.9)
28 5700 (39.3)

4 Flexural strength: Tested per ASTM C 348 with following results: Days Flexural Strength - psi (MPa)
1 600 (4.1)
3 700 (4.8)
7 800 (5.5)

5 Abrasion resistance: Average weight loss of 8.3 g, tested per ASTM C 944 with 20 Kfg load.

6 Initial set: 65 minutes, tested per ASTM C 191.

7 Final set: 90 minutes, tested per ASTM C 191.

2.7 MATERIALS - NON-SLIP AGGREGATES

A. Non-Slip Aggregates:

1 Product: Emery Non-Slip.

2 Description: 100 percent pure emery.

3 Moh hardness of treated concrete: 8 to 9.

Edit the following to suit project requirements. No. 14 to 36 is typical.

4 Mesh size: [No. 14 to 36.] [No. 30 to 80.] [No. 8 to 35.] [No. 16 to 50.]

2.8 MATERIALS - FINISHING AID

Include the following for a VOC compliant evaporation retardation/finishing aid for concrete surfaces.
This product should be used:
During include hot weather, low humidity, high winds, direct sunlight on surfaces, or interior heated spaces during cold weather. Reduces shrinkage cracking during hot weather.
For concrete mixes having low water-cement ratio, superplasticizers, or silica fume.
For shake-on floor hardeners or toppings.

A. Finishing Aid:

1 Product: Sure Film (J-74).

2 Description: Concentrated, water based, proprietary organic emulsion with fugitive dye.

2.9 ACCESSORIES

Include one of the following for bonding floor toppings to base slabs.

A. Bonding Agent:

1 Product: Day-Chem Ad Bond (J-40).
2 Description: Non-reemulsifiable, acrylic latex emulsion bonding agent.
3 Meet ASTM C 1042, Type II.

4 Bond strength: Tested per ASTM C 1059 with following results: Test Age Compressive Strength
psi (MPa)
14 days 1865 (12.9)
28 days 2436 (16.8)

**** OR ****
B. Epoxy Adhesive:

1 Product: Resi-Bond (J-58).

2 Description: Two component, pre-proportioned, 100 percent solids, high strength, medium viscosity
epoxy bonding adhesive.

3 Meet ASTM C 881, Types 1, 2, 4, and 5, Grade 2, Classes B and C.

4 Compressive strength: 10,400 psi (71.7 MPa), tested per ASTM D 695 at 7 days.

5 Bond strength: Tested per ASTM C 882 with following results:

a. 2550 psi (17.6 MPa) at 2 days.

b. 3150 psi (21.7 MPa) at 14 days.

1 Modulus of elasticity: 275,000 psi (1896.0 MPa), tested per ASTM D 695.

2 Tensile strength: 7580 psi (52.3 MPa), tested per ASTM D 638.

2.10 MIXING
Include the following paragraph only for products requiring site mixing or thinning.

A. Mix materials in accordance with manufacturer's instructions.
3 EXECUTION

3.1 PREPARATION
Include the following paragraph only where existing surfaces are involved.

A. Clean surfaces to remove loose and foreign matter that could interfere with application or performance of products. Allow surfaces to dry completely before beginning application.

B. Protect adjacent and underlying surfaces.

3.2 APPLICATION - FINISHING AID

A. Follow manufacturer's instructions for application and coverage.

B. Apply to concrete surfaces immediately after screeding by low pressure sprayer producing a fine mist.

C. Uniformly cover surfaces at rate of 200 to 400 square feet per gallon (4.9 to 9.8 sq m/L) after dilution.

D. If severe drying conditions exist, reapply prior to finishing.

3.3 APPLICATION - CURING [AND SEALING] COMPOUNDS

A. Follow manufacturer's instructions for application and coverage.

B. Apply as soon as concrete can be walked on without marring the surface and as soon as free surface water has disappeared.

C. Apply by low pressure spray, roller, or brush, without puddling.

3.4 APPLICATION - [SEALING AND] HARDENING COMPOUNDS

A. Follow manufacturer's instructions for application and coverage.

B. Allow new concrete to cure minimum 7 days, preferably 28 days, before applying.

C. Apply by low pressure spray, roller, or brush, without puddling.

3.5 APPLICATION - DRY-SHAKE HARDENING COMPOUNDS

A. Follow manufacturer's instructions for application and coverage.

B. Level concrete with vibratory screed. Fill voids.

C. Level surface with darby or bull float.

D. Allow surface bleed water to start to dissipate.

E. Uniformly broadcast one-half to two-thirds of hardener over surface without voids or buildups. Avoid segregation of fines and granules.

F. Allow hardener to remain on surface until uniform in color, then wood or power float to smooth, level surface. Do not steel trowel or use combination blades.

G. Immediately apply remainder of hardener. Apply perpendicular to direction of first application unless a mechanical spreader is used.

H. Allow hardener to remain on surface until uniform in color. After surface water has been absorbed, thoroughly float, then steel trowel to smooth, level surface. Do not re-wet or overwork the surface or trowel too early.
Include the following paragraph when textured surface is desired; edit to suit project requirements.

I. Apply [broom] [textured] [____] finish.

J. Apply two coats curing and sealing compound.

3.6 APPLICATION - FLOOR TOPPINGS

A. Follow manufacturer's instructions for application.
Include the following paragraph when a slurry coat is used.

B. Wet surfaces with clean water 24 hours prior to applying topping.

C. Apply slurry coat of cement and bonding agent to base slab just prior to applying topping.

D. Apply floor topping to minimum 3/4 inch (19 mm) depth.

E. Immediately screed surface, then trowel to smooth, level surface.
Include the following paragraph when textured surface is desired; edit to suit project requirements.

F. Apply [broom] [textured] [____] finish.

G. Apply two coats curing and sealing compound.

3.7 APPLICATION - NON-SLIP AGGREGATE

A. Follow manufacturer's instructions for application and coverage.

B. Level concrete with vibratory screed. Fill voids.

C. Level surface with darby or bull float.

D. Allow surface bleed water to start to dissipate.

E. Uniformly broadcast two-thirds of aggregate over surface without voids or buildups.

F. Allow aggregate to remain on surface until uniform in color, then wood or power float to level surface. Do not steel trowel or use combination blades. Leave part of aggregate exposed on surface.

G. Immediately apply remainder of aggregate. Apply perpendicular to direction of first application unless a mechanical spreader is used.

H. Allow aggregate to remain on surface until uniform in color, then wood or power float to level surface. Do not steel trowel or use combination blades. Leave part of aggregate exposed on surface.

I. Apply two coats curing and sealing compound.

END OF SECTION